

09567863

09/976,968

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*** YOU HAVE NEW MAIL ***

=> s nanoparticle (4a) different (3a) oligonucleotides

L1 23 NANOPARTICLE (4A) DIFFERENT (3A) OLIGONUCLEOTIDES

=> dup rem l1

PROCESSING COMPLETED FOR L1

L2 23 DUP REM L1 (0 DUPLICATES REMOVED)

=> d l2 bib abs 1-23

L2 ANSWER 1 OF 23 USPATFULL

AN 2003:30222 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES

Park, So-Jung, Evanston, IL, UNITED STATES

PI US 2003022169 A1 20030130

AI US 2001-820279 A1 20010328 (9)

RLI Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan 2001,
PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun
1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-176409P 20000113 (60)

US 2000-200161P 20000426 (60)

US 2000-192699P 20000328 (60)

US 2000-254392P 20001208 (60)

US 2000-255235P 20001211 (60)

DT Utility

FS APPLICATION

LREP MCDONNELL BOEHNNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE
3200, CHICAGO, IL, 60606

CLMN Number of Claims: 570

ECL Exemplary Claim: 1

DRWN 65 Drawing Page(s)

LN.CNT 11127

09567863

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.F

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 2 OF 23 USPATFULL

AN 2003:13189 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, United States
Letsinger, Robert L., Wilmette, IL, United States
Mucic, Robert C., Glendale, CA, United States
Storhoff, James J., Evanston, IL, United States
Elghanian, Robert, Chicago, IL, United States
Taton, Thomas A., Chicago, IL, United States

PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)

PI US 6506564 B1 20030114

AI US 2000-603830 20000626 (9)

RLI Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999

Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999

Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997

PRAI US 2000-200161P 20000426 (60)

US 1996-31809P 19960729 (60)

DT Utility

FS GRANTED

EXNAM Primary Examiner: Riley, Jezia

LREP McDonnell Boehnen Hulbert & Berghoff

CLMN Number of Claims: 42

ECL Exemplary Claim: 1

DRWN 84 Drawing Figure(s); 47 Drawing Page(s)

LN.CNT 5976

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 3 OF 23 WPIDS (C) 2003 THOMSON DERWENT
AN 2002-608256 [65] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];
2002-258024 [30]; 2003-092900 [08]
DNC C2002-171859
TI Detecting nucleic acid having two portions, by providing nanoparticles
having oligonucleotides attached to it, contacting nucleic acid and
nanoparticles to allow hybridization, and observing detectable change.
DC B04 D16
IN ELGHANIAN, R; GARIMELLA, V; LETSINGER, R L; LI, Z; MIRKIN, C A; MUCIC, R
C; PARK, S; STORHOFF, J J; TATON, T A
PA (NANO-N) NANOSPHERE INC; (ELGH-I) ELGHANIAN R; (GARI-I) GARIMELLA V;
(LETS-I) LETSINGER R L; (LIZZ-I) LI Z; (MIRK-I) MIRKIN C A; (MUCI-I) MUCIC
R C; (PARK-I) PARK S; (STOR-I) STORHOFF J J; (TATO-I) TATON T A
CYC 98
PI WO 2002046472 A2 20020613 (200265)* EN 442p
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ
NL OA PT SD SE SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK
DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN 'IS JP KE KG KP KR
KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PH PL PT RO
RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
AU 2002030593 A 20020618 (200266)
US 2002172953 A1 20021121 (200279)
ADT WO 2002046472 A2 WO 2001-US46418 20011207; AU 2002030593 A AU 2002-30593
20011207; US 2002172953 A1 Provisional US 1996-31809P 19960729, CIP of WO
1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US
1999-344667 19990625, Provisional US 2000-176409P 20000113, Provisional US
2000-192699P 20000328, Provisional US 2000-200161P 20000426, CIP of US
2000-603830 20000626, Provisional US 2000-224631P 20000811, Provisional US
2000-254392P 20001208, Provisional US 2000-255235P 20001211, CIP of US
2001-760500 20010112, CIP of US 2001-820279 20010328, US 2001-927777
20010810
FDT AU 2002030593 A Based on WO 200246472; US 2002172953 A1 CIP of US 6361944
PRAI US 2001-927777 20010810; US 2000-254392P 20001208; US 2000-254418P
20001208; US 2000-255235P 20001211; US 2000-255236P 20001211; US
2001-760500 20010112; US 2001-820279 20010328; US 2001-282640P
20010409; US 1996-31809P 19960729; WO 1997-US12783 19970721; US
1999-240755 19990129; US 1999-344667 19990625; US 2000-176409P
20000113; US 2000-192699P 20000328; US 2000-200161P 20000426; US
2000-603830 20000626; US 2000-224631P 20000811
AN 2002-608256 [65] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];
2002-258024 [30]; 2003-092900 [08]
AB WO 200246472 A UPAB: 20030204
NOVELTY - Detecting (M1) nucleic acid having two portions, involves
providing nanoparticles having oligonucleotides attached to it, which has
a sequence complementary to sequence of two portions of nucleic acid,
contacting nucleic acid and nanoparticles, to allow hybridization of
oligonucleotides with two or more portions of nucleic acid, and observing
a detectable change brought about by hybridization.
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the
following:
(1) a kit comprising a container holding a composition comprising two
types of nanoparticles having oligonucleotides attached to it, where the
oligonucleotides on the first type of nanoparticles has a sequence
complementary to the sequence of a first portion of a nucleic acid, and
the oligonucleotides on the second type of nanoparticles has a sequence
complementary to the sequence of a second portion of the nucleic acid;
(2) an aggregate probe comprising at least two types of nanoparticles
having oligonucleotides attached to it, where the nanoparticles of the

aggregate probe is bound to each other as a result of the hybridization of some of the oligonucleotides attached to them, and has oligonucleotides having attached to it which have a sequence complementary to a portion of the sequence of a nucleic acid;

(3) a core probe comprising at least two types of nanoparticles having oligonucleotides attached to it, where the nanoparticles is bound to each other as a result of hybridization of some of the oligonucleotides attached to it;

(4) a substrate having nanoparticles attached to it;

(5) a metallic or semiconductor nanoparticle having oligonucleotides attached to it, where the oligonucleotides are labeled with fluorescent molecules at the ends not attached to the nanoparticle;

(6) a satellite probe comprising a particle having oligonucleotides attached to it, and probe oligonucleotides hybridized to the oligonucleotides attached to the nanoparticles, and having a first portion and a second portion, where the first portion has a sequence complementary to the sequence of the first portion of oligonucleotides attached to the particles, and both portions has sequences complementary to portions of the sequence of the nucleic acid, and the probe oligonucleotide further has a reporter molecule attached to one end;

(7) a composition comprising at least two types of nanoparticles having oligonucleotides attached to it;

(8) an assembly of containers comprising a first and second containers holding nanoparticles having oligonucleotides attached to it, which has a sequence complementary to that of the oligonucleotides attached to the nanoparticles in the containers;

(9) a **nanoparticle (I)** having several **different oligonucleotides** attached to it which comprises recognition oligonucleotides, each comprising a spacer portion designed so that it is bound to the nanoparticle, and a recognition portion having a sequence complementary to a portion of the sequence of the nucleic acid or another oligonucleotide, and optionally a type of diluent oligonucleotides;

(10) binding (M2) oligonucleotides to charged nanoparticles to produce stable nanoparticle-oligonucleotide conjugates;

(11) nanoparticle-oligonucleotide conjugates (II) which are nanoparticles having oligonucleotides attached to them which is present on the surface of the nanoparticles at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another oligonucleotide, and a covalently bound cyclic disulfide or polythiol functional group;

(12) oligonucleotides having a covalently bound cyclic disulfide or polythiol functional group that can bind to the nanoparticles;

(13) a nanoparticle conjugate for detecting an analyte, comprising nanoparticles having oligonucleotides bound to it, and oligonucleotide having bound to it a specific binding complement of an analyte having a sequence that is complementary to a portion of the oligonucleotides bound to the nanoparticles and are bound, as a result of hybridization, and a linker oligonucleotide having two portions;

(14) nonmaterials (III) or nanostructures composed of nanoparticles having oligonucleotides attached to it, where the nanoparticles are held together by oligonucleotide connectors;

(15) a kit for detecting an analyte, comprising a container holding (II), and optional support for observing a detectable change;

(16) a nanomaterial produced, by providing linking oligonucleotide comprising two portions, two types of nanoparticles having oligonucleotides attached to it, and a complex comprised of streptavidin or avidin bound to two or more biotin molecules, each having an oligonucleotide bound to the biotin molecule, which has a sequence that is complementary to the second portion of the linking oligonucleotide, and contacting the first and second types of nanoparticles, the linking oligonucleotides and the complex, to allow hybridization of the oligonucleotides on the nanoparticles to each other and to the linking

oligonucleotide and the hybridization of the oligonucleotide of the complexes to the linking oligonucleotides so that a desired nanomaterials or nanostructures is formed; and

(17) accelerating movement of a nanoparticle to an electrode surface.

USE - (M1), (I), (II) and the aggregate probe are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (II) is useful for preparing a nanoprobe conjugate for detecting an analyte, and for detecting a nucleic acid bound to an electrode surface. (I) and (II) are useful for fabrication, and for separating a selected nucleic acid having two portions from other nucleic acids. (I), (II) and the aggregate probe are useful for detecting an analyte (especially polyvalent analyte) in a sample (all claimed).

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.

Dwg.0/67

L2 ANSWER 4 OF 23 USPATFULL
 AN 2002:337329 USPATFULL
 TI Bio-barcodes based on oligonucleotide-modified nanoparticles
 IN Mirkin, Chad A., Willmette, IL, UNITED STATES
 Park, So-Jung, Evanston, IL, UNITED STATES
 Nam, Jwa-Min, Evanston, IL, UNITED STATES
 PI US 2002192687 A1 20021219
 AI US 2002-108211 A1 20020327 (10)
 RLI Continuation-in-part of Ser. No. US 2001-820279, filed on 28 Mar 2001,
 PENDING
 PRAI WO 2001-US10071 20010328
 US 2000-192699P 20000328 (60)
 US 2001-350560P 20011113 (60)
 DT Utility
 FS APPLICATION
 LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE
 3200, CHICAGO, IL, 60606
 CLMN Number of Claims: 41
 ECL Exemplary Claim: 1
 DRWN 4 Drawing Page(s)
 LN.CNT 2185
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.
 AB The present invention relates to a screening methods, compositions, and
 kits for detecting for the presence or absence of one or more target
 analytes, e.g. proteins such as antibodies, in a sample. In particular,
 the present invention relates to a method that utilizes reporter
 oligonucleotides as biochemical barcodes for detecting multiple protein
 structures or other target analytes in one solution.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 5 OF 23 USPATFULL
 AN 2002:322449 USPATFULL
 TI Nanoparticles having oligonucleotides attached thereto and uses therefor
 IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
 Letsinger, Robert L., Wilmette, IL, UNITED STATES
 Mucic, Robert C., Glendale, CA, UNITED STATES
 Storhoff, James J., Evanston, IL, UNITED STATES
 Elghanian, Robert, Skokie, IL, UNITED STATES
 Taton, Thomas A., Little Canada, MN, UNITED STATES
 PA Nanosphere, Inc. (U.S. corporation)
 PI US 2002182613 A1 20021205
 AI US 2001-976971 A1 20011012 (9)

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RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 172

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 6563

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the
method, the oligonucleotides are attached to nanoparticles and have
sequences complementary to portions of the sequence of the nucleic acid.
A detectable change (preferably a color change) is brought about as a
result of the hybridization of the oligonucleotides on the nanoparticles
to the nucleic acid. The invention also provides compositions and kits
comprising particles. The invention further provides nanomaterials and
nanostructures comprising nanoparticles and methods of nanofabrication
utilizing the nanoparticles. Finally, the invention provides a method of
separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 6 OF 23 USPATFULL

AN 2002:322447 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES

Mucic, Robert C., Glendale, CA, UNITED STATES

Storhoff, James J., Evanston, IL, UNITED STATES

Elghanian, Robert, Skokie, IL, UNITED STATES

Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2002182611 A1 20021205

AI US 2001-966491 A1 20010928 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE
3200, CHICAGO, IL, 60606

CLMN Number of Claims: 190

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 6646

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the

method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 7 OF 23 USPATFULL

AN 2002:307830 USPATFULL

TI Movement of biomolecule-coated nanoparticles in an electric field

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES

Mucic, Robert C., Glendale, CA, UNITED STATES

Storhoff, James J., Evanston, IL, UNITED STATES

Elghanian, Robert, Chicago, IL, UNITED STATES

Taton, Thomas Andrew, Chicago, IL, UNITED STATES

Garimella, Viswanadham, Evanston, IL, UNITED STATES

Li, Zhi, Evanston, IL, UNITED STATES

Park, So-Jung, Evanston, IL, UNITED STATES

PI US 2002172953 A1 20021121

AI US 2001-927777 A1 20010810 (9)

RLI Continuation-in-part of Ser. No. US 2001-820279, filed on 28 Mar 2001, PENDING Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan 2001, PENDING Continuation-in-part of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-176409P 20000113 (60)

US 2000-200161P 20000426 (60)

US 2000-192699P 20000328 (60)

US 2000-254392P 20001208 (60)

US 2000-255235P 20001211 (60)

US 2000-224631P 20000811 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.

Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 598

ECL Exemplary Claim: 1

DRWN 64 Drawing Page(s)

LN.CNT 11435

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures

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comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 8 OF 23 USPATFULL
AN 2002:294562 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Chicago, IL, UNITED STATES
Taton, Thomas A., Chicago, IL, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002164605 A1 20021107
AI US 2001-966312 A1 20010928 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE
3200, CHICAGO, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8066

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 9 OF 23 USPATFULL
AN 2002:287518 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas Andrew, Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)

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PI US 2002160381 A1 20021031
AI US 2001-975498 A1 20011011 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
PENDING Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan
1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed
on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 5695

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the
method, the oligonucleotides are attached to nanoparticles and have
sequences complementary to portions of the sequence of the nucleic acid.
A detectable change (preferably a color change) is brought about as a
result of the hybridization of the oligonucleotides on the nanoparticles
to the nucleic acid. The invention also provides compositions and kits
comprising particles. The invention further provides methods of
synthesizing unique nanoparticle-oligonucleotide conjugates, the
conjugates produced by the methods, and methods of using the conjugates.
In addition, the invention provides nanomaterials and nanostructures
comprising nanoparticles and methods of nanofabrication utilizing
nanoparticles. Finally, the invention provides a method of separating a
selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 10 OF 23 USPATFULL
AN 2002:280028 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas Andrew, Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002155462 A1 20021024
AI US 2001-976577 A1 20011012 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)

09567863

LN.CNT 8047

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 11 OF 23 USPATFULL

AN 2002:280027 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES

Mucic, Robert C., Glendale, CA, UNITED STATES

Storhoff, James J., Evanston, IL, UNITED STATES

Elghanian, Robert, Skokie, IL, UNITED STATES

Taton, Thomas Andrew, Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2002155461 A1 20021024

AI US 2001-976378 A1 20011012 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8052

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a

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selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 12 OF 23 USPATFULL
AN 2002:280025 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002155459 A1 20021024
AI US 2001-975062 A1 20011011 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8059

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the
method, the oligonucleotides are attached to nanoparticles and have
sequences complementary to portions of the sequence of the nucleic acid.
A detectable change (preferably a color change) is brought about as a
result of the hybridization of the oligonucleotides on the nanoparticles
to the nucleic acid. The invention also provides compositions and kits
comprising particles. The invention further provides methods of
synthesizing unique nanoparticle-oligonucleotide conjugates, the
conjugates produced by the methods, and methods of using the conjugates.
In addition, the invention provides nanomaterials and nanostructures
comprising nanoparticles and methods of nanofabrication utilizing
nanoparticles. Finally, the invention provides a method of separating a
selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 13 OF 23 USPATFULL
AN 2002:280024 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002155458 A1 20021024
AI US 2001-967409 A1 20010928 (9)

09567863

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE
3200, CHICAGO, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8059

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the
method, the oligonucleotides are attached to nanoparticles and have
sequences complementary to portions of the sequence of the nucleic acid.
A detectable change (preferably a color change) is brought about as a
result of the hybridization of the oligonucleotides on the nanoparticles
to the nucleic acid. The invention also provides compositions and kits
comprising particles. The invention further provides methods of
synthesizing unique nanoparticle-oligonucleotide conjugates, the
conjugates produced by the methods, and methods of using the conjugates.
In addition, the invention provides nanomaterials and nanostructures
comprising nanoparticles and methods of nanofabrication utilizing
nanoparticles. Finally, the invention provides a method of separating a
selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 14 OF 23 USPATFULL

AN 2002:280008 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES

Mucic, Robert C., Glendale, CA, UNITED STATES

Storhoff, James J., Evanston, IL, UNITED STATES

Elghanian, Robert, Chicago, IL, UNITED STATES

Taton, Thomas A., Little Canada, MN, UNITED STATES

Garimella, Viswanadham, Evanston, IL, UNITED STATES

Li, Zhi, Evanston, IL, UNITED STATES

PI US 2002155442 A1 20021024

AI US 2001-760500 A1 20010112 (9)

RLI Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-200161P 20000426 (60)

US 2000-176409P 20000113 (60)

US 2000-213906P 20000626 (60)

DT Utility

FS APPLICATION

LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE
3200, CHICAGO, IL, 60606

CLMN Number of Claims: 485

ECL Exemplary Claim: 1

DRWN 51 Drawing Page(s)

09567863

LN.CNT 8754

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 15 OF 23 USPATFULL

AN 2002:265844 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES

Letsinger, Robert L., Wilmette, IL, UNITED STATES

Mucic, Robert C., Glendale, CA, UNITED STATES

Storhoff, James J., Evanston, IL, UNITED STATES

Elghanian, Robert, Skokie, IL, UNITED STATES

Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2002146720 A1 20021010

AI US 2001-961949 A1 20010920 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)

US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8063

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a

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selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 16 OF 23 USPATFULL
AN 2002:251128 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002137072 A1 20020926
AI US 2001-976617 A1 20011012 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8061

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the
method, the oligonucleotides are attached to nanoparticles and have
sequences complementary to portions of the sequence of the nucleic acid.
A detectable change (preferably a color change) is brought about as a
result of the hybridization of the oligonucleotides on the nanoparticles
to the nucleic acid. The invention also provides compositions and kits
comprising particles. The invention further provides methods of
synthesizing unique nanoparticle-oligonucleotide conjugates, the
conjugates produced by the methods, and methods of using the conjugates.
In addition, the invention provides nanomaterials and nanostructures
comprising nanoparticles and methods of nanofabrication utilizing
nanoparticles. Finally, the invention provides a method of separating a
selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 17 OF 23 USPATFULL
AN 2002:251127 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002137071 A1 20020926
AI US 2001-974007 A1 20011010 (9)

09567863

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8063

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the
method, the oligonucleotides are attached to nanoparticles and have
sequences complementary to portions of the sequence of the nucleic acid.
A detectable change (preferably a color change) is brought about as a
result of the hybridization of the oligonucleotides on the nanoparticles
to the nucleic acid. The invention also provides compositions and kits
comprising particles. The invention further provides methods of
synthesizing unique nanoparticle-oligonucleotide conjugates, the
conjugates produced by the methods, and methods of using the conjugates.
In addition, the invention provides nanomaterials and nanostructures
comprising nanoparticles and methods of nanofabrication utilizing
nanoparticles. Finally, the invention provides a method of separating a
selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 18 OF 23 USPATFULL

AN 2002:251126 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES

PA Nanosphere, Inc. (U.S. corporation)

PI US 2002137070 A1 20020926

AI US 2001-973638 A1 20011010 (9)

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN

PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)

DT Utility

FS APPLICATION

LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606

CLMN Number of Claims: 431

ECL Exemplary Claim: 1

DRWN 46 Drawing Page(s)

LN.CNT 8060

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

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AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 19 OF 23 USPATFULL
AN 2002:251114 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Chicago, IL, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002137058 A1 20020926
AI US 2001-923625 A1 20010807 (9)
RLI Continuation of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997,
UNKNOWN
PRAI US 1996-31809P 19960729 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 105
ECL Exemplary Claim: 1
DRWN 26 Drawing Page(s)
LN.CNT 3903

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 20 OF 23 USPATFULL
AN 2002:235385 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES

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Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002127574 A1 20020912
AI US 2001-973788 A1 20011010 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8060
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the
method, the oligonucleotides are attached to nanoparticles and have
sequences complementary to portions of the sequence of the nucleic acid.
A detectable change (preferably a color change) is brought about as a
result of the hybridization of the oligonucleotides on the nanoparticles
to the nucleic acid. The invention also provides compositions and kits
comprising particles. The invention further provides methods of
synthesizing unique nanoparticle-oligonucleotide conjugates, the
conjugates produced by the methods, and methods of using the conjugates.
In addition, the invention provides nanomaterials and nanostructures
comprising nanoparticles and methods of nanofabrication utilizing
nanoparticles. Finally, the invention provides a method of separating a
selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 21 OF 23 USPATFULL
AN 2002:332594 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, United States
Letsinger, Robert L., Wilmette, IL, United States
Mucic, Robert C., Glendale, CA, United States
Storhoff, James J., Evanston, IL, United States
Elghanian, Robert, Chicago, IL, United States
PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)
PI US 6495324 B1 20021217
AI US 2000-693005 20001020 (9)
RLI Division of Ser. No. US 1999-344667, filed on 25 Jun 1999
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997
PRAI US 1996-31809P 19960729 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Riley, Jezia
LREP McDonnell Boehnen Hulbert & Berghoff
CLMN Number of Claims: 21
ECL Exemplary Claim: 1

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DRWN 62 Drawing Figure(s); 34 Drawing Page(s)

LN.CNT 4289

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 22 OF 23 USPATFULL

AN 2002:168347 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, United States
Letsinger, Robert L., Wilmette, IL, United States
Mucic, Robert C., Glendale, CA, United States
Storhoff, James J., Evanston, IL, United States
Elghanian, Robert, Chicago, IL, United States

PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)

PI US 6417340 B1 20020709

AI US 2000-693352 20001020 (9)

RLI Division of Ser. No. US 1999-344667, filed on 25 Jun 1999
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999,
now abandoned Continuation-in-part of Ser. No. WO 1997-US12783, filed on
21 Jul 1997

PRAI US 1996-31809P 19960729 (60)

DT Utility

FS GRANTED

EXNAM Primary Examiner: Riley, Jezia

LREP McDonnell Boehnen Hulbert & Berghoff

CLMN Number of Claims: 10

ECL Exemplary Claim: 1

DRWN 58 Drawing Figure(s); 34 Drawing Page(s)

LN.CNT 4214

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L2 ANSWER 23 OF 23 USPATFULL

AN 2002:63683 USPATFULL

TI Nanoparticles having oligonucleotides attached thereto and uses therefor

IN Mirkin, Chad A., Wilmette, IL, United States

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Letsinger, Robert L., Wilmette, IL, United States
Mucic, Robert C., Glendale, CA, United States
Storhoff, James J., Evanston, IL, United States
Elghanian, Robert, Chicago, IL, United States
PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)
PI US 6361944 B1 20020326
AI US 1999-344667 19990625 (9)
RLI Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997
PRAI US 1996-31809P 19960729 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Riley, Jezia
LREP McDonnell Boehnen Hulbert & Berghoff
CLMN Number of Claims: 12
ECL Exemplary Claim: 1
DRWN 58 Drawing Figure(s); 34 Drawing Page(s)
LN.CNT 4158

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing the nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

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his

(FILE 'HOME' ENTERED AT 17:01:12 ON 21 FEB 2003)

FILE 'BIOSIS, MEDLINE, CAPLUS, WPIDS, USPATFULL' ENTERED AT 17:01:27 ON
21 FEB 2003

L1 23 S NANOPARTICLE (4A) DIFFERENT (3A) OLIGONUCLEOTIDES

L2 23 DUP REM L1 (0 DUPLICATES REMOVED)

=> s gold particle (5a) different (4a) oligonucleotides

L3 0 GOLD PARTICLE (5A) DIFFERENT (4A) OLIGONUCLEOTIDES

=> s gold (5a) different (5a) oligonucleotides

L4 6 GOLD (5A) DIFFERENT (5A) OLIGONUCLEOTIDES

=> dup rem l4

PROCESSING COMPLETED FOR L4

L5 4 DUP REM L4 (2 DUPLICATES REMOVED)

=> d l5 bib abs 1-4

L5 ANSWER 1 OF 4 CAPLUS COPYRIGHT 2003 ACS

AN 2003:35314 CAPLUS

DN 138:101934

TI Gold nanoparticles having oligonucleotides attached and their use in
hybridization assays

IN Mirkin, Chad A.; Letsinger, Robert L.; Mucic, Robert C.; Storhoff, James
J.; Elghanian, Robert; Taton, Thomas A.

PA Nanosphere, Inc., USA

SO U.S., 108 pp., Cont.-in-part of U.S. Ser. No. 344,667.
CODEN: USXXAM

DT Patent

LA English

FAN.CNT 13

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6506564	B1	20030114	US 2000-603830	20000626
	WO 9804740	A1	19980205	WO 1997-US12783	19970721
	W:	AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG			
	US 6361944	B1	20020326	US 1999-344667	19990625
	WO 2001051665	A2	20010719	WO 2001-US1190	20010112
	WO 2001051665	C2	20021031		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG			
	WO 2001073123	A2	20011004	WO 2001-US10071	20010328
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT,			

LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU,
SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU,
ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,
DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF,
BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

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US 2002146720	A1	20021010	US 2001-961949	20010920
US 2002155458	A1	20021024	US 2001-967409	20010928
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US 2002137070	A1	20020926	US 2001-973638	20011010
US 2002137071	A1	20020926	US 2001-974007	20011010
US 2002155459	A1	20021024	US 2001-975062	20011011
US 2002160381	A1	20021031	US 2001-975498	20011011
US 2002137072	A1	20020926	US 2001-976617	20011012
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US 2002155462	A1	20021024	US 2001-976577	20011012
US 2002182613	A1	20021205	US 2001-976971	20011012

PRAI US 1996-31809P P 19960729
WO 1997-US12783 A2 19970721
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US 2000-200161P P 20000426
US 1996-31809 A 19960729
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US 2000-192699P P 20000328
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US 2000-603830 A 20000626
US 2000-224631P P 20000811
US 2000-254392P P 20001208
US 2000-255235P P 20001211
US 2001-760500 A 20010112
US 2001-820279 A 20010328

AB The invention provides methods of detecting a target nucleic acid. The methods comprise contacting the nucleic acid with one or more types of gold nanoparticles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to two portions of the sequence of the target nucleic acid. In another embodiment there are at least two types of nanoparticles having oligonucleotides attached each of which is complementary to a different portion of the target nucleic acid. In yet another embodiment substrate-immobilized oligonucleotides complementary to a portion of the target nucleic acid are combined with "substrate" gold nanoparticles attached to two **different oligonucleotides**, one complementary to another portion of the target nucleic acid and the other complementary to the oligonucleotide on still another gold nanoparticle-oligonucleotide complex, a "core" gold nanoparticle-oligonucleotide complex. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The gold nanoparticle-oligonucleotide complexes are prepd. by contacting the nanoparticles and oligonucleotides in water to allow binding then to a salt soln. to allow further binding. The invention also provides kits comprising nanoparticles with oligonucleotides attached.

RE.CNT 94 THERE ARE 94 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

09567863

TI Electrochemical detection of nucleic base mismatches with ferrocenyl naphthalene diimide.

AU Yamashita, Kenichi; Takagi, Makoto; Kondo, Hiroki; Takenaka, Shigeori (1)

CS (1) Department of Applied Chemistry, Faculty of Engineering, Kyushu University, Fukuoka, 812-8581: staketcm@mbbox.nc.kyushu-u.ac.jp Japan

SO Analytical Biochemistry, (July 15, 2002) Vol. 306, No. 2, pp. 188-196. <http://www.academicpress.com/ab>. print. ISSN: 0003-2697.

DT Article

LA English

AB Electrochemical detection of nucleic base mismatches was attempted successfully with ferrocenyl naphthalene diimide (FND) in a model system with 20-meric double-stranded oligonucleotides with or without a mismatch(es). Thus, dA20 or a 20-meric sequence of the lac Z gene was immobilized on a gold electrode and complementary oligonucleotides with different numbers of mismatches were allowed to hybridize in the presence of FND to give rise to an electrochemical signal. The signal intensity varied depending on the number of unpaired bases on the DNA duplex. From experiments with a quartz crystal microbalance, eight molecules of FND were found to bind to the 20-meric double-stranded oligos and this number decreased as the number of mismatches increased. These findings were further supported by matrix-assisted laser desorption ionization time-of-flight mass spectroscopy. This novel method will be useful for the analysis of single-nucleotide polymorphisms present on human genes.

L5 ANSWER 3 OF 4 WPIDS (C) 2003 THOMSON DERWENT

AN 2001-191567 [19] WPIDS

DNN N2001-136110 DNC C2001-057452

TI Apparatus and method for detecting single nucleotide polymorphism and point mutation in gene, useful in multiple DNA analysis with high sensitivity for e.g. disease diagnosis.

DC B04 D16 S03

IN MIYAHARA, T; TAKENAKA, S; UCHIDA, K

PA (MIYA-I) MIYABARA T; (TAKE-I) TAKENAKA S; (UCHI-I) UCHIDA K; (MIYA-I) MIYAHARA T

CYC 23

PI WO 2001011351 A1 20010215 (200119)* JA 23p
RW: AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
W: CN KR US
JP: 2001050931 A 20010223 (200127) 8p
EP 1120646 A1 20010801 (200144) EN
R: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
KR 2001079961 A 20010822 (200213)
CN 1320212 A 20011031 (200215)

ADT WO 2001011351 A1 WO 2000-JP5093 20000801; JP 2001050931 A JP 1999-224681 19990806; EP 1120646 A1 EP 2000-948305 20000801; WO 2000-JP5093 20000801; KR 2001079961 A KR 2001-704060 20010329; CN 1320212 A CN 2000-801637 20000801

FDT EP 1120646 A1 Based on WO 200111351

PRAI JP 1999-224681 19990806

AN 2001-191567 [19] WPIDS

AB WO 200111351 A UPAB: 20010405
NOVELTY - Detection chip for detecting single nucleotide polymorphism (SNP) and point mutation in a gene comprises gold electrodes formed on the bottom face of a closed space into which a sample DNA can be packed or removed, with polymerase chain reaction (PCR) products or oligonucleotides with different gene sequences immobilized on the gold electrodes, and a common electrode not in contact with these gold electrodes. When a voltage is applied between the common electrode and gold electrodes, a current can be measured for the detection of one-base substitution SNP and point mutation in the gene.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) an apparatus comprising the detection chip with a detector for the generated current after applying a voltage across the electrodes; and

(2) a method for detecting SNP and point mutation in a gene by forming double strand after hybridization by amplification of the DNA in the sample, followed by filling with an electroactive molecule-containing electrolyte to the space, bonding the electroactive molecule with the double strand under temperature control, applying voltage, and measuring the current value.

USE - The apparatus and method are for detecting single nucleotide polymorphism and point mutations in genes and are useful in multiple DNA analysis with high sensitivity for e.g. disease diagnosis.

ADVANTAGE - The method can be applied in multiple DNA analysis and has high sensitivity.

Dwg.0/4

L5 ANSWER 4 OF 4 USPATFULL
 AN 1999:163426 USPATFULL
 TI Compositions, methods, kits and apparatus for determining the presence or absence of target molecules
 IN Grossman, Abraham, Pleasantville, NY, United States
 PA InVitro Diagnostics, Inc., United States (U.S. corporation)
 PI US 6001570 19991214
 AI US 1997-801154 19970218 (8)
 DT Utility
 FS Granted
 EXNAM Primary Examiner: Houtteman, Scott W.
 LREP Janiuk, Anthony J.
 CLMN Number of Claims: 10
 ECL Exemplary Claim: 1
 DRWN 1 Drawing Figure(s); 1 Drawing Page(s)
 LN.CNT 1814
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.
 AB The present invention is directed to methods, compositions, kits and apparatus; to identify and detect the presence or absence of target analytes. The embodiments of the present invention have utility in medical diagnosis and analysis of various chemical compounds in specimens and samples, as well as the design of test kits and apparatus for implementing such methods.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

=> d l5 4 kwic

L5 ANSWER 4 OF 4 USPATFULL
 SUMM . . . as few as three winners and as many as fourteen
 `aptamer-winners` are SELEXed at the end of the experiments for
 different targets (Gold et al., 1995). High affinity
 oligonucleotides have already been identified for more than
 forty different compounds. In general, aptamers from in vitro selection
 resemble protein antibodies. . .